The Wilmington Wave

National Weather Service, Wilmington, NC

Spring 2020 Volume X, Issue I

INSIDE THIS ISSUE:

Australia IMET Deployment

By Terry Lebo

As an IMET (Incident Meteorologist), Meteorologist Terry Lebo spent 6 weeks in Sydney Australia from mid-January through February to help them out with the historic wildfires affecting the country. Here is his story:

Terry returned from Sydney in March.

During the nearly 6 weeks I spent working at the Bureau of Meteorology (BoM) in Australia, several different major weather events occurred. My first day at the office, January 16th, coincided with the first real rainfall in the area in weeks. It was not a heavy rain, but rain fell on and off the entire day with just over half an inch of rain falling on the 16th and almost 1.35" falling on the 17th. Prior to that rainfall in mid-January, the last time over a tenth of an inch of rain was recorded in Sydney was November 27, 2019. To give you an idea of how dry October through December 2019 was, the average rainfall for that period is about 7.50". The observed rainfall was 2.50". December was particularly dry with just 0.07" falling in the month. Normal rainfall for December is about 2.50". This was the beginning of an improvement in the unprecedented wildfire situation the area was experiencing.

The pattern started to shift early- to mid-January, transitioning to a more active, wet pattern. Severe thunderstorms on January 20th across parts of the Sydney Regional Forecast Center (RFC) area of responsibility brought heavy rainfall and large amounts of damaging hail. This is a link to a news article about the storms: https://www.theguardian.com/australia-news/2020/jan/20/severe-thunderstorms-and-hail-to-batter-south-eastern-australia.

This was just a hint of some of the weather that was to come during the next few weeks. By the end of January, rainfall was becoming more plentiful, although most areas still ended up with rainfall below average for the month. The severe weather event on January 20th was fueled by hot temperatures. The Sydney airport, which is influenced by its proximity to the ocean, recorded high temperatures of 86, 87, 91, and 111°F January 20th through January 23rd. For reference, the average high in January is around 80°F.

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Sydney Bureau of Meteorology Regional Forecast Center

A series of cold fronts followed the 4-day stretch of above normal temperatures, however the fronts brought little to no rainfall to the region. Temperatures for the end of January into the beginning of February followed a pattern consisting of a couple days of temperatures in the lower 80s, followed by a day with temperatures spiking to near 100°F, and then returning back to the lowers 80s. The only day with significant rainfall was February 3rd when around an inch of rain fell across the area. The difference between this and earlier events came down to the presence of low pressure aloft and deeper moisture. This feature would set the stage for a record rainfall event the second week of February.

A strong coastal trough developed along the north New South Wales (NSW) coast on February 6th. This feature slowly moved south during the next few days. There was concern that an east coast low, or ECL, would develop. An ECL is similar to a strong Nor'easter, but they tend to linger longer than a typical Nor'easter. Heavy rain, flooding, strong winds, and dangerous, damaging surf are all threats associated with an ECL. Although the low never materialized, the results of the strong trough mimicked those of an ECL. Very heavy rain and very strong winds were recorded across coastal NSW late February 6th through early February 10th. Rainfall amounts in most areas ranged from 15 to 20 inches, with some areas approaching 25 inches for the 5 day event. In many locations, the 5 day rainfall total was roughly equal to 25 to 30% of their average yearly rainfall! At the Sydney Airport, winds gusted as high as 55 mph while sustained wind speeds of 35 to 40 mph were common. The maximum wave height measured during the event at the Sydney wave buoy, just east of the city, was over 45 ft.

In the wake of the trough and the excessive rainfall, most of the bushfires were out, with some in southern and inland areas barely continuing to smolder. Conditions more typical for mid to late February returned to NSW, with a short period of mild and dry conditions, followed by the passage of a cold front. This pattern repeated several times through the end of the month. During one of my last days working in Sydney, a strong cold front was forecast to move in from the west-southwest, with showers and possibly severe thunderstorms forecast. The storms did end up developing, just a few hours later than expected. Widespread damage was reported from the evening storms across eastern parts of NSW. In Sydney, wind gusts of 60 to 70 mph were reported, along with widespread reports of trees down and over 70,000 locations without power. A large portion of a tree across the street from my hotel came down in the storm.

An interesting aspect with some, but not all, of the cold front passages in eastern Australia is a phenomenon referred to as "The Change". The phrase "The Change" or "A Change" is a common local term and is understood by a majority of the people in the region. Media uses the phrase and I heard it mentioned in various conversations during my travels around the city. The Change refers to a very sharp and distinct cold front passage, and is associated with cold fronts that move in from the south or even southeast, as opposed to fronts moving in from the southwest. Ahead of the front, temperatures are above average, with light to moderate warm winds from the northwest. Once the change arrives, the winds quickly shift to southerly and increase in strength rapidly. Significant temperature changes can occur with the change, with temperatures dropping 20 to 25 F in just a few minutes with the strongest events. Change events tend to have limited rainfall, but not always.

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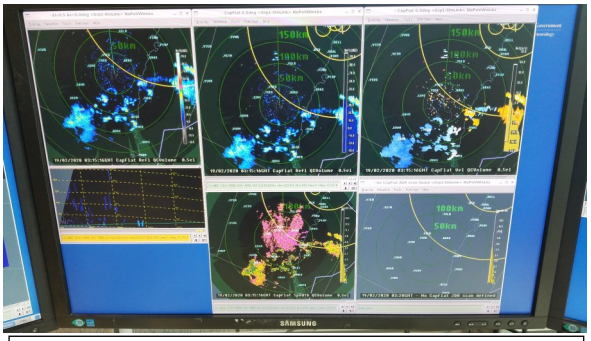
When I arrived, there were close to 30 fires requesting daily forecasts. A forecaster familiar with the process and "in the groove" can complete around 8 per day, while still providing an accurate forecast with plenty of detail. My first week, I was struggling to finish 3 by the deadline. Each day, the Fire Behavior Analysts, or FBANs, would send in daily forecast requests. Typically FBANs would be responsible for several fires. One of the fires we were supporting was over 600,000 hectares or around 1.5 million acres. To give an example of size, that is larger than Bladen and Columbus counties combined. That fire, the Border Fire, stretched from well inland mountainous terrain to the coast, making the forecast even more challenging. The BoM does not dispatch meteorologists to a specific fire like the NWS does, but they do have people scheduled to go to their local Rural Fire Services Headquarters. This allows for face-to-face interaction with BoM staff, as well as a quick flow of information back and forth.

A typical day for IMETs sent over to assist with forecast duties at the Sydney RFC of the BoM is spent working on forecasts for the various fires. The Australians refer to their fire forecasts as spotties, which reminds me of a cross between NWS spot forecasts and an IAP forecast. During the process, there was open dialog between both BoM meteorologists and IMETs concerning features and conditions during the forecast. Each forecast could require significant amounts of detail depending on the weather expected during the next 24 hours. The workload was typically distributed by either location, inland fires vs coastal fires, or expected weather, fires north of the front vs fires south of the front for example. This did make the text portions of the forecast somewhat easier, as a simple copy and paste would provide a rough starting point for fires in close proximity to each other. Terrain still needed to be addressed, however.

Most of my time at the BoM consisted of fire forecasting. However, there were 2 shifts in which I was asked to alter my hours and watch radar instead. This was during the heavy rain event that took place the second week of February. Instead of working late morning to early evening, I was asked to work 12.5 hour shifts overnight, (1900-0730). Normally the BoM only has one meteorologist on during the overnight period, and management was worried that the one forecaster would be overwhelmed. Flooding was the main threat each night, although severe convection was also possible through the evening and into the overnight. The radar, observation, and warning issuance software the BoM uses are completely different from what is used by the NWS. The day before my radar shifts, I spent 45 minutes going through a crash course in all 3 programs with one of the BoM meteorologists. In addition to different software, the Sydney RFC radar network is a mix of 57s (no velocity) and 88Ds with and without dual pol. It made for an interesting warning experience. BoM has two warnings: a severe thunderstorm warning and a severe weather warning. Typically, a severe thunderstorm warning is issued for 3 hours while the severe weather warning is issued for 6 hours.



Radar display at the Bureau of Meteorology

In summary, it was an amazing experience and I feel honored that I was able to not only represent the office and the NWS, but help out another group of very dedicated meteorologists that were short staffed during an historic fire season. I feel like the experience helped to enhance my forecasting skills and introduced me to some tools and ideas I would otherwise not have been exposed to. I hope to be able to apply some of what I learned in Australia toward enhancing our operations, some of our products, and/or the services we provide for our users.

Rip Currents & SRF Product

By Vicky Oliva

Rip currents are the most frequent cause of weather deaths in the Wilmington NWS forecast area. In 2019, there were **19 surf zone fatalities** in North and South Carolina, **11 of which were attributed to rip currents**. The Carolinas average **7 rip current fatalities** per year, with only **16% of drownings** since 2000 being people from the coastal counties of the Carolinas. These stats show the importance of spreading rip current awareness and safety. **Please check with public officials regarding beach closures before heading to the beach!**

What is a rip current?

✓ Rip currents are fast flowing channels of water that extend from close to the shoreline through the surf and past the breaking waves.

✓ Strong rips can reach speeds faster than an Olympic swimmer!

X Rip currents will not pull you under the water, but will carry you away from shore.

How do you spot a rip current?

✓ Easiest to spot rip currents from an elevated position overlooking the beach.

✓ Rip currents may look darker, muddy, or choppier than surrounding areas.

✓ Look for areas where waves are not breaking.

How do you escape a rip current?

✓ Swim parallel to the shoreline to escape the current, and then swim back to shore at an angle away from the rip.

✓ If you become exhausted, tread water or float and get the attention of people onshore.

If you see someone caught in a rip current, immediately notify a lifeguard or beach patrol. If you have to enter the water, be sure to take something that floats with you. Sadly, some rip current victims are bystanders who drown making an attempted rescue without taking precautions.

Remember to never swim alone at the beach and always try to swim near lifeguards. Heed warning flags, signs, and verbal commands of lifeguards and local law enforcement. Avoid swimming near jetties and piers, as rip currents commonly develop near these structures. Don't swim in the ocean at night.

Many other hazards exist year-round at North and South Carolina beaches. These include heat, lightning, rough surf, environmental hazards, and biological hazards such as jellyfish and sharks. Being informed about these hazards prior to going to beach can help keep you and your family safe. For a great article on the various dangers at the beach and tips to stay safe, visit the NOAA Beach Safety Story Map: https://www.noaa.gov/stories/story-map-play-it-safe.

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One of the best ways to keep you and your family safe while visiting the beach is to **Know Before You Go**. Be sure to check the local NWS Surf Forecast for the beach before going to see if any hazards will be present. At Wilmington, NC NWS, we issue our Surf Forecast three times a day - in the morning by 5:30am, an update at 11am, and in the evening by 8:30pm (for the next day's forecast).

The product is broken up into 5 sections - one for each coastal county in our area. It includes a detailed forecast that every user should be aware of before visiting the beach, including rip current risk, ultraviolet exposure risk, and surf height, as well as the weather forecast for the area.

There are several ways you can access the current Surf Forecast this summer before going to the beach. One way is go to weather.gov/beach/ilm to view current rip risks and click for more detail. Another way is to search for "NWS ILM SRF" in your web browser. Our main webpage also has a link to all recent text products.

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NCZ106-250915-
Coastal Pender-
Including the beaches of Surf City and Topsail Island
428 PM EST Fri Jan 24 2020

.SATURDAY...
Rip Current Risk*.....High.
Surf Height.....Around 3 feet.
Lightning Potential**.....None.
Waterspout Potential**.....None.
UV Index**.....Moderate.
Water Temperature.....Lower 50s.
Weather.....Mostly sunny. A chance of showers.
High Temperature.....In the lower 60s.
Winds.....West winds around 10 mph.
Tides...
   Topsail Inlet.....High 4.8 feet (MLLW) 07:39 AM EST.
                     Low -0.3 feet (MLLW) 02:02 PM EST.
Remarks.....Weak south to north longshore current.

.SUNDAY...
Rip Current Risk*.....Moderate.
Surf Height.....Around 3 feet.
Lightning Potential**.....None.
Waterspout Potential**.....None.
Weather.....Sunny.
High Temperature.....In the mid 50s.
Winds.....West winds 5 to 10 mph.
Tides...
   Topsail Inlet.....High 4.7 feet (MLLW) 08:18 AM EST.
                     Low -0.2 feet (MLLW) 02:40 PM EST.
Remarks.....None.

.OUTLOOK...
Moderate rip risk forecast for Monday and Tuesday.

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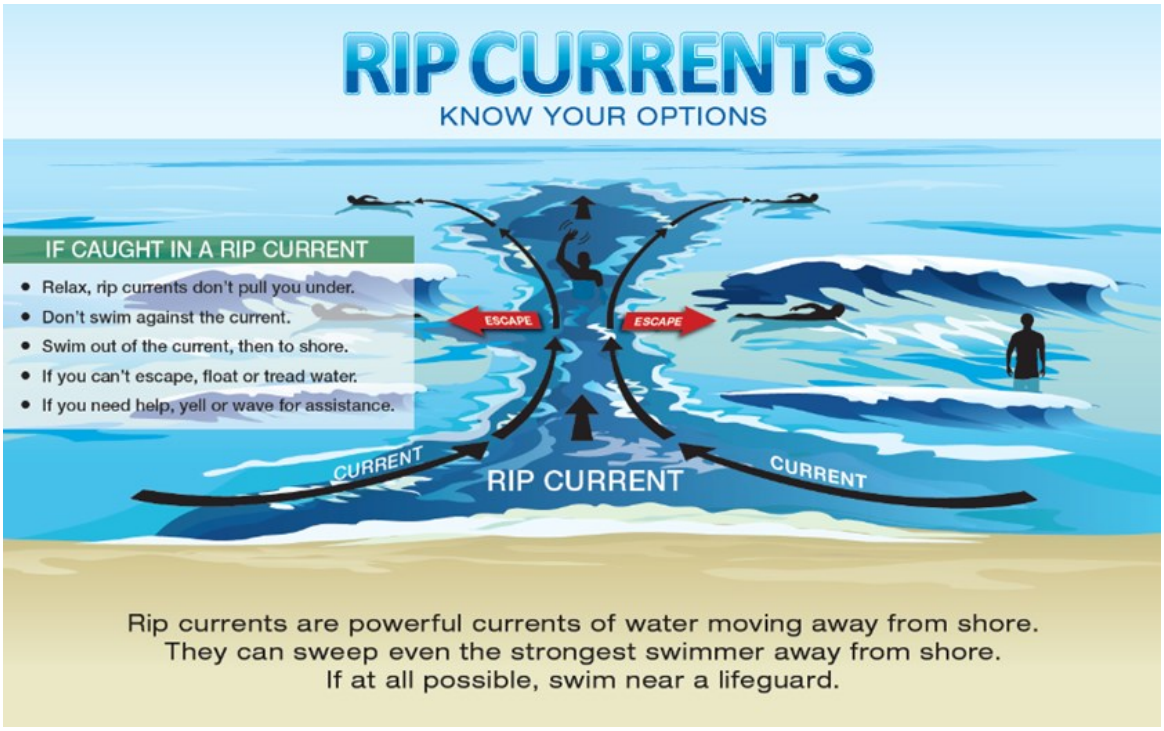
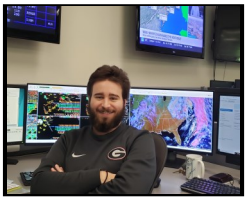
New SRF format beginning 2020 beach season



Q&A with the New Meteorologist



Ian Boatman joined the Wilmington NWS team in December 2019 as the newest Meteorologist straight from the University of Georgia. Currently, Ian is responsible for aviation, surf, and river forecasting, as well as various quality control tasks. Here's a few questions we asked the new guy to introduce him to our community:

Q: Where did you go to school and what was your NWS Career Path to get to NWS Wilmington?
A: I am VERY PROUD to say that I spent the BEST 6 years of my life at the University of Georgia. In May 2017, I finished undergrad with a B.S. in Atmospheric Sciences and a B.S. in Geography. I returned to UGA immediately to start graduate school and officially attained Double Dawg status in December 2019 by earning a M.S. in Geography. My Masters thesis is entitled, "The Development of an Empirically-based Definition of Epidemic Thunderstorm Asthma." In the earlier portion of my college career, I was initially interested in broadcast meteorology. After going down that path a little bit, I saw parts of that field that I didn't really like, so I knew it was time for me to go in a different direction. NWS was always something that I had in the back of my mind, and eventually, an opportunity opened. The UGA Atmospheric Sciences Program has a good working relationship with folks at NWS Peachtree City (located southwest of Atlanta, and Georgia's only NWS office). During the Fall 2018 semester, word got out that that office was going to have vacancies soon, and they offered UGA students to drive over and check out the office, and shadow under some of their forecasters. That was my first time walking into a NWS office seeing what it was like. In November 2018, during my second year of graduate school, I applied to the NWS for the first time. This began a process that eventually found me here at NWS Wilmington! After sending in 5 applications across 21 offices, it took me 11 months from the time I started applying to the time I got my official, final offer from NWS Wilmington. I started on Monday, December 9, 2019, and I haven't looked back. I am stupid lucky to be here with a wonderful team!

Q: Why did you decide to pursue a career at the NWS?
A; To me, the NWS mission statement is all about service. Yes, it's a bunch of weather nerds having fun with the observations and forecasts, but it's a very important and essential service that we're providing. When I was going through the application process, I saw countless examples of selfless souls who were in this career to protect friends, family, and strangers alike. That enthusiasm for service above all else was perhaps the biggest reason why I wanted to join what the NWS. I am excited to find my own way to contribute to our shared mission.

Q: What is your current role at NWS Wilmington?
A: My official title is simply just "Meteorologist." A large portion of my responsibilities is all about training. Believe it or not, when you first get hired, it takes two years to complete all of your training! Outside of that, I work a public service shift that contains a lot of social media interaction, as well as providing other services, such as publishing river observations/forecasts and performing quality control on NOAA Weather Radio. Speaking of social media, I was recently elected to be the Social Media Focal Point of NWS Wilmington, which basically means that I am now the leader of our social media program. I will be working with others in the office to see how we can improve our social media presence. I'm very excited to expand my role!

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Q: How did you become interested in weather?
A: It was The Weather Channel that did it for me when I was a kid. Like every other kid, I watched my favorite cartoons in the mornings. But once those were over, I could flip on The Weather Channel and watch for hours. It wasn't any one thing that got me hooked. It was the smooth jazz music they would play, the cool graphics they would show, and the footage they would play of hurricanes, tornadoes, or just your run-of-the-mill summertime thunderstorm. From that point, at the ripe, old age of 6 years old, I decided that I was going to be a meteorologist.

Q: What's your favorite type of weather?
A: That's honestly hard to nail down. From a meteorological perspective, there is a sense of beauty when you watch severe and winter weather forecasts, because one by one, you see all the indices come together. However, I also appreciate a nice, tame sunny day, because you don't have to worry about lives being at risk. Now that I live at the beach, I'll probably enjoy sunny days more than ever before!

Q: What's the most memorable weather event you've experienced?
A: There was about a two-week period from late January to mid-February 2014 where some crazy winter weather impacted Georgia. On January 28th, I was a freshman at UGA at the time, and the infamous "Atlanta Snowpocalypse" occurred. While Atlanta was suffering consequences from that, Athens just saw a bunch of snow and didn't see a lot of infrastructure issues. Classes were cancelled for a whole week, and my days were composed of playing in the snow all day with my roommates and dorm friends, and then we'd cram 15 people in my dorm room that evening and just watch TV. A couple weeks later, my parents in Augusta saw the worst ice storm to ever hit the area. Ice accumulations were over an inch, and it absolutely debilitated the region. I wasn't personally there for that one, but the pictures and videos that my parents sent me were unbelievable.

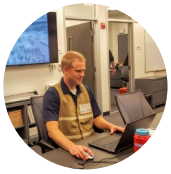
Q: What do you like to do in your spare time?
A: I am an absolute avid Georgia sports fanatic. You'll catch me screaming about the Georgia Bulldogs, Atlanta Falcons, Atlanta Braves, Atlanta United, etc. If you come from SEC country, you know exactly what that means, and how football season is filled with traditions and pageantry. I was on the UGA Spike Squad (a student spirit group that wears body paint for all UGA athletic events) for all four years of undergrad, including being president of it my junior year. You will always see me show my pride for my home teams, and the great state of Georgia in general. GO DAWGS! Elsewhere, I love seeing the outdoors, and checking out local food culture wherever I go. If you're looking for someone to check the new local hotspot, I'm your guy. Cheers!

Interested in a career at the National Weather Service? Check out the links below!

Careers in Meteorology

Careers in Hydrology

Careers in Physical Science



Careers in Operational Support

Careers in Information Technology and Electronics Maintenance

Current NWS Job Openings

NOAA Student Opportunities

Seneca Guns: Theories About Them Have Been "Booming" Lately

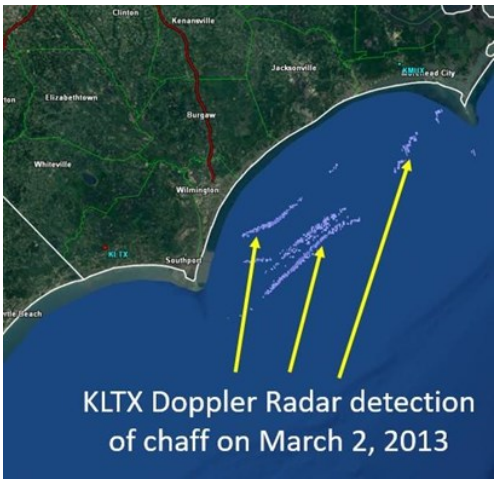
By Steve Pfaff

From time to time residents in southeast NC and northeast SC have reported hearing loud booms or have had their homes rattled by the "Seneca Guns" or "Carolina Booms". The booms are not unique to the coastal Carolinas as they have been observed by people near Lake Seneca, NY dating as far back as 1850. The tremors and booms have also been felt around the world including the "Barisal Guns" In India, the "Abu Dabbab – Father of Knocks" near the Red Sea, "Uminari" in Japan, "Brontidi" of Italy, the "Retumbos" of the Phillipines, and the "Mistpouffers" in the Netherlands. On average in northeast SC and southeast NC these events are reported a couple times a year with no apparent rhyme or reason. However, the frequency of reports has increased during the last few decades. While the origin of the local booms has not been proven there are several theories for their occurrence. Ultimately, the Seneca Guns are likely a result of multiple sources and sometimes the answer can be surmised by the details of the people who feel and subsequently report them.

Sorry conspiracy theorists – but most, but not all, of the Carolina events can be attributed to military aircraft maneuvering over the adjacent Atlantic waters. At times, these aircraft will break the sound barrier (>200 dB) which sends a shockwave through the atmosphere. When this type of boom event occurs people report that it feels as if the reverberations come at them through the air, versus coming from the ground shaking. When the NWS receives Seneca Gun reports the first thing we do is look for evidence of military aircraft on the WSR-88D Doppler Radar. It is estimated that over 95% of the boom reports we receive have occurred when military aircraft were operating off the coast.

While the Doppler Radar located in Shallotte, NC can't directly detect individual aircraft (it does not employ the wavelength used to observe very large targets) it can detect the "chaff" deployed by military aircraft during their exercises. Chaff are tiny strips of foil used to confuse radar guided missiles. When chaff is dispersed into the atmosphere atmospheric winds will distribute them into "chaff trails" observable by Doppler Radar. Keep in mind that when chaff is deployed it does not cause the booming sound - but simply confirms military aircraft operating in the area. As a result, it is inferred that some of the aircraft have broken the sound barrier at some point during their maneuvers during these types of events.

Depending on the presence of atmospheric inversions the shockwave from aircraft breaking the sound barrier can travel significant distances. For instance, when the Concorde was in service and departed LaGuardia Airport in New York each morning, people along the coast in central and southern New Jersey would hear the booms! Under the right conditions It would not be surprising to experience the booms from aircraft operating more than 40 miles off our coast.



Now the story gets a little more interesting – if military aircraft breaking the sound barrier account for most boom events, then what is causing the remaining 5% of the events? The source of the rarer Seneca Gun events, those that feel more seismic in nature reverberating the ground and shaking homes, are a much bigger unknown. When these more unique and infrequent subset of boom events occur, seismic data typically do not reveal the occurrence of any earthquake. Are these micro earthquakes too small to detect, or is there something else going on?

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There are several theories including military gunfire, the collapse of underground or underwater caves, thunderstorms (local and distant), submarine landslides, shallow offshore earthquakes, undersea methane releases, seismic movements through igneous crust, and small meteors exploding in the atmosphere. Let's objectively explore several of these – then you decide!

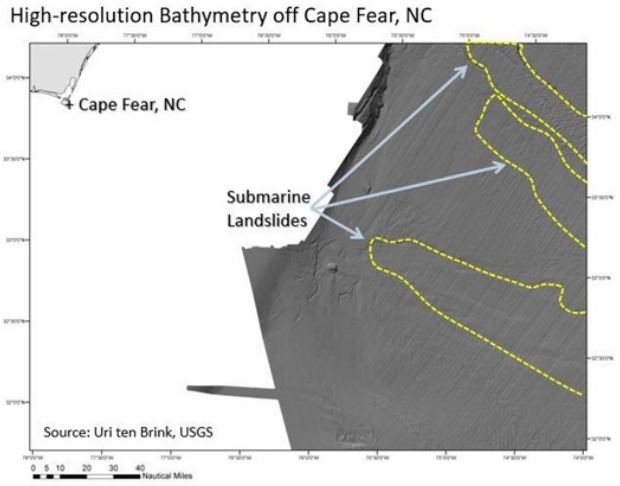
There are several military facilities around the area as well as naval ships operating off the coast from time to time. The detonation of missiles and bombs from aircraft and percussion of Howitzer cannons (140 dB) and ship gunfire can result in rumbling sounds. For instance, people who live in Surf City, NC and Hampstead, NC can routinely hear the rumbling of cannon fire from Camp Lejeune, especially with a favorable wind direction and atmospheric temperature inversion in place. The rumbling is hardly enough to shake homes at greater distances, typically very repetitive, and are very short-lived booms, which are not characteristics of the Seneca Guns.

As ground water conditions can drastically change across the region characterized by a sandy sub-surface it is not uncommon for underground voids or caves to form and collapse. As larger voids collapse it would not be inconceivable to feel and hear them, but likely only in those areas within a reasonable distance from the collapsed cave. Patricia Lake in Boiling Spring Lakes, NC had drained multiple times as voids under the lake collapsed allowing the water to flow out of the lake. However, no booms were reported when the lake began to empty.

Regarding thunderstorms, people can typically hear thunder (between 90 and 140 dB) when a lightning strike occurs within 12-15 miles of their location. WSR-88D Doppler Radar can easily detect the location thunderstorms within long-range views of approximately 250 nm. While thunder can rumble for several seconds, and closer strikes can reverberate homes, single Seneca Gun events and their respective impacts are observed by people over a significantly larger area than what a single lightning strike produces. In addition, when the big boom events have occurred there are typically no thunderstorms within hundreds of miles of where the reports are received.

Submarine landslides and shallow underwater earthquakes are a potential origin of the booms. High resolution USGS bathymetry maps of the adjacent continental slope show evidence of dozens of past submarine landslides. It is estimated that some of the larger slumps occurred thousands of years ago and were also likely capable of generating local tsunami events. Any small earthquake that occurs along the outer continental shelf or the slope itself can trigger a sub-marine landslide. The sound and shaking from the submarine landslide could perpetuate along the sea floor and be felt along coastal areas.

During the mid 1960's a renowned charter boat captain from Carolina Beach, NC was fishing in +300' water offshore when suddenly his boat began to cavitate and shake. The captain contacted a nearby vessel and the same conditions were also reported by the other captain. About 20 minutes later the captain observed that the ocean turned quite turbulent and brown as if the ocean overturned with sedimentation from the bottom of the ocean forced upward through the water column. The captain later moved to a new fishing location several miles away where ocean conditions appeared normal. The captain reported the event to the USCG along with his weather report that day. Based on his report it was very likely the captain was in an area where a small submarine landslide occurred!



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Additionally, seismic movement through igneous crust can reverberate like a tuning fork. If you have two separate plates of igneous rock sliding against each other then the booms and shaking could be felt. Researchers studying the "Abbu Dabbab" of the Red Sea region have found the cause of the booms to be coincident with a plate of igneous rock sliding across another sub-plate of igneous rock. When subtle shifts occur the sound and shaking reverberates near the areas where these plates exist. It should be noted that maps from the NC Department of Environmental Quality show that a cluster of minor and micro earthquakes have occurred in the vicinity of the lower Cape Fear River over the decades – but there are no discernable seismic faults observed in the area. However, it is possible that much smaller undiscovered faults may exist, which act to tune the booms when very subtle geologic shifting occurs. There were booms reported with the occurrence of the Great Charleston, SC earthquake in 1886, but that was a much larger geologic event.

Another theory includes the release of undersea methane gas bubbles. As the gas is released the domes that encase them could collapse resulting in shaking and booming sounds. Methane deposits can be found off the Carolina coast, but these types of releases would have to be significant enough to cause an undersea collapse and sink hole to form. The systematic release of methane on its own would not likely cause the booming sound itself, therefore it is speculated that the methane release would have to be extremely significant to cause a boom event.

Lastly, small meteors called bolides can explode as they cut through the Earth's atmosphere in turn causing a shockwave type of boom. These atmospheric explosions may account for some of the booms recorded over the years. In addition, the sound and shaking created by a bolide would be similar in character to the booms caused by military aircraft breaking the sound barrier. However, since the boom events appear to be confined from coastal southeast NC into portions of northeast SC it is very unlikely that bolides are the only source of the booms.

Two things are apparent after this long diatribe – the Seneca Guns will continue from time to time, as will the speculation about the source of them as they occur. Keep in mind that most can be attributed to military aircraft breaking the sound barrier while we still need to explore the origins of the rarer boom events!

CoCoRaHs Needs You!

Ever wonder how much rain fell during a thunderstorm at your house, or how much snow fell during a winter event? Do you have an interest in weather and would like to help your local community, as well as scientists and others interested in precipitation? Then CoCoRaHs is for you! CoCoRaHs, the Community Collaborative Rain, Hail and Snow Network, is a unique, non-profit, community-based, high density network of individual and family volunteers of all ages and backgrounds, who take daily measurements of rain, hail and snow in their backyards. CoCoRaHs is continuously looking for new volunteers to help expand the national precipitation observation network.

So how can you join CoCoRaHs? It only takes four simple steps: register online at www.cocorahs.org, view online training slideshow, purchase a rain gauge, and record and report observations. Volunteers may obtain an official 4-inch rain gauge through the CoCoRaHS website for about $31 plus shipping. Volunteers post their daily observations on the CoCoRaHs website, or using the free mobile app. Observations are immediately available in map (data.cocorahs.org/cartodb) and table form for scientists and the public to view. The process takes only five minutes a day and gives you the chance to participate in real "hands-on" science. You may be amazed at what you will learn as you become more aware of the weather that impacts you and your neighbors.

Hurricane Safety & Products

By Jordan Baker

Preparation

- Know your zone: Do you live near the Gulf or Atlantic Coasts? Find out if you live in a hurricane evacuation area by contacting your local government/emergency management office or by checking the evacuation site website.
- Put Together an Emergency Kit: Put together a basic emergency. Check emergency equipment, such as flashlights, generators and storm shutters.
- Write or review your Family Emergency Plan: Before an emergency happens, sit down with your family or close friends and decide how you will get in contact with each other, where you will go, and what you will do in an emergency. Keep a copy of this plan in your emergency supplies kit or another safe place where you can access it in the event of a disaster. Start at the Ready.Gov emergency plan webpage.
- Review Your Insurance Policies: Review your insurance policies to ensure that you have adequate coverage for your home and personal property.

Visit: https://www.ready.gov/kit for a list of supplies to include.

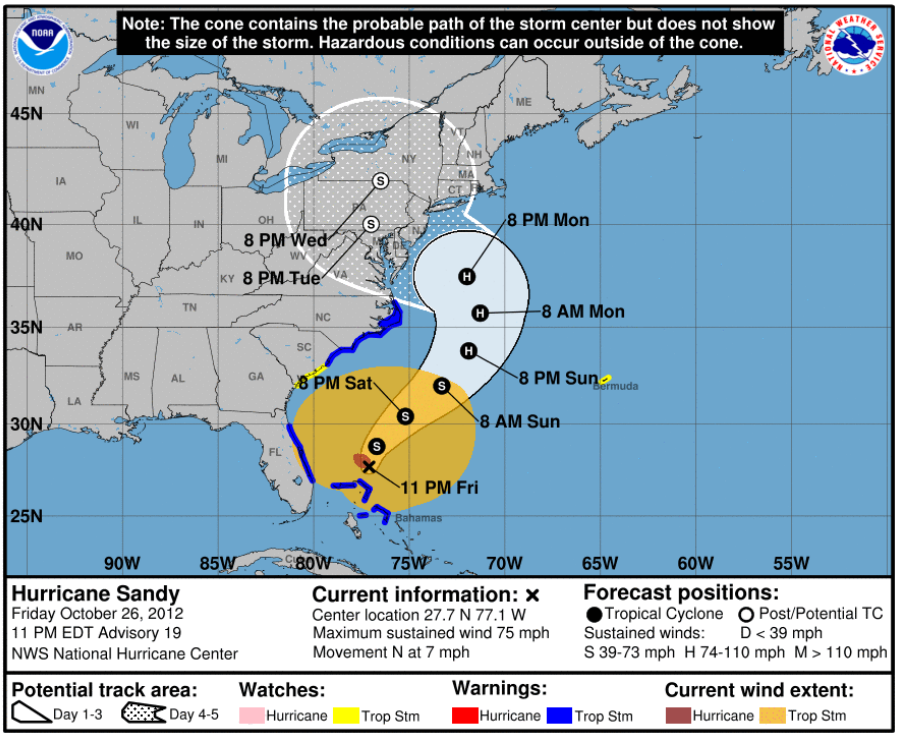
National Weather Service Products

The Forecast Cone

There are several National Weather Service products that assist those in the path of an approaching tropical system. Many of these well-known products are created at the National Hurricane Center in Miami, Florida including the most well-known product: the "Forecast Cone." Despite these products being widely used by the media and national, state, and local emergency managers, the public often confuses the message within the graphic.

Let's start with the basics. At the bottom of the graphic (Forecast Cone is on page 12) is current storm information. This includes the position, movement, and wind speed associated with the tropical storm. From this information, we can discern the storm's category. **Please ALWAYS remember that the category of a tropical system DOES NOT PROPERLY INDICATE POTENTIAL THREAT!** The category is based on wind speed **ONLY**, not the impacts of a storm such as flooding rainfall or storm surge (both of these being the leading killers associated with tropical storms and hurricanes).

Next, we will look at the graphic itself. Within the graphic there are black circles and a white background. Take a moment to analyze this for yourself and think of how you would interpret this information. What do the black circles mean? What does the white background indicate? If you're outside of the cone, do you need to prepare?



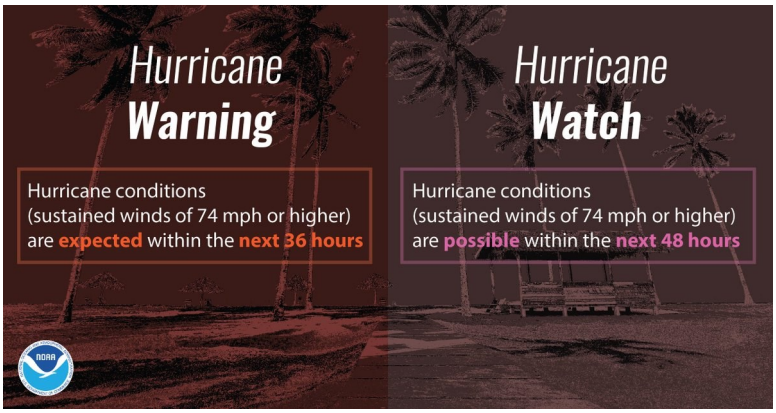
These black circles indicate timing. At each of those black circles is the forecasted **center of the storm**. This would also be the location of the eye of the storm. A time is included to give the approximate location and timing of the storm.

What about the white background? Many people believe that this will be the extent of the impacts, but that is not true. Impacts are often felt well outside of the forecast cone. In fact, the orange and brown areas around the current center (marked with an "X") indicated the extent of Tropical Storm and Hurricane force winds. See how far this extends outside of the cone?

So what does the white area within this graphic represent? The white background indicates the possible center of the storm's location. On a more technical level, the National Hurricane Center (who issues this product), uses their forecast error over the last 5 years to create this statistical white area. Without describing the details of the calculation, there is a 67% chance that the center of the storm will track within this white area. This is why the cone gets bigger with time: uncertainty increases for longer range forecasts!

Watches & Warnings

Tropical cyclone **Watches** typically indicate that Tropical Storm or Hurricane conditions are possible within 48 hours. Storm Surge watches are also issued to indicate a possibility of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within 48 hours. Preparations should be coming to a close before the watch is issued.



Warnings indicate that conditions are likely within 36 hours. This includes Tropical Storms, Hurricanes, and Storm Surge Warnings. If your area is under a Warning, **preparations should be complete and you should evacuate immediately if told to do so.**

Want to Become a Weather-Ready Nation Ambassador?

By Steve Pfaff

It's no surprise for many that live in southeast NC and northeast SC that we are susceptible to a wide variety of weather impacts. In fact, our part of the country is like no other when it comes to the different hazards we have to prepare for including wind driven wildfires, hurricanes, ice storms, flooding, tornado outbreaks, severe thunderstorms, drought, etc. Although many of these events do not occur routinely, if we fail to plan for them then many will become caught off guard by their impacts. The National Weather Service (NWS) is responsible for doing storm survey assessments of areas hit hard by severe weather, and a common theme we hear from those who were hit hardest is – "I can't believe this happened to me". While most people agree that we have an exposure to hazardous weather, only a small segment of the population is ideally prepared to deal with extreme weather events.

During a typical year the United States has 100,000 severe thunderstorms, 5,000 floods and flash floods, 1,000 tornadoes, and 2 land-falling hurricanes. It's no wonder why our Nation needs to be Weather-Ready. While there have been advancements in weather related technology and research that have led to the increased accuracy and warning lead time over the last decade, people are still being killed in great numbers. For instance, during 2011 there were 549 fatalities from tornadoes – almost 300 people during the Alabama outbreak on a single day! As a result, the NWS has started a new program called Weather-Ready Nation to enhance community resilience in the face of extreme weather events across the Nation.

The Weather-Ready Nation Ambassador program is the initiative that recognizes a wide variety of partners in their efforts to advocate weather safety and planning. The Ambassadors help to unify weather safety efforts, are action-oriented, inclusive, and help lead to new partnership opportunities with the NWS. The Ambassador program is open to any club, organization, company, civic group, or government agency (Local/State/Federal) and is free to join. There are no formal guidelines or requirements to become an Ambassador other than to sign-up and become integrated into the pipeline of weather safety information through the Weather-Ready Nation program. Consider the following - does weather potentially impact your family, friends, club members, staff or coworkers? If you answered yes then consider joining to become a Weather-Ready Nation Ambassador. Help the NWS to better serve our local communities by signing up!

For more information, and to apply to become a WRN Ambassador, visit: https://www.weather.gov/wrn/about

AMBASSADOR™

WRN

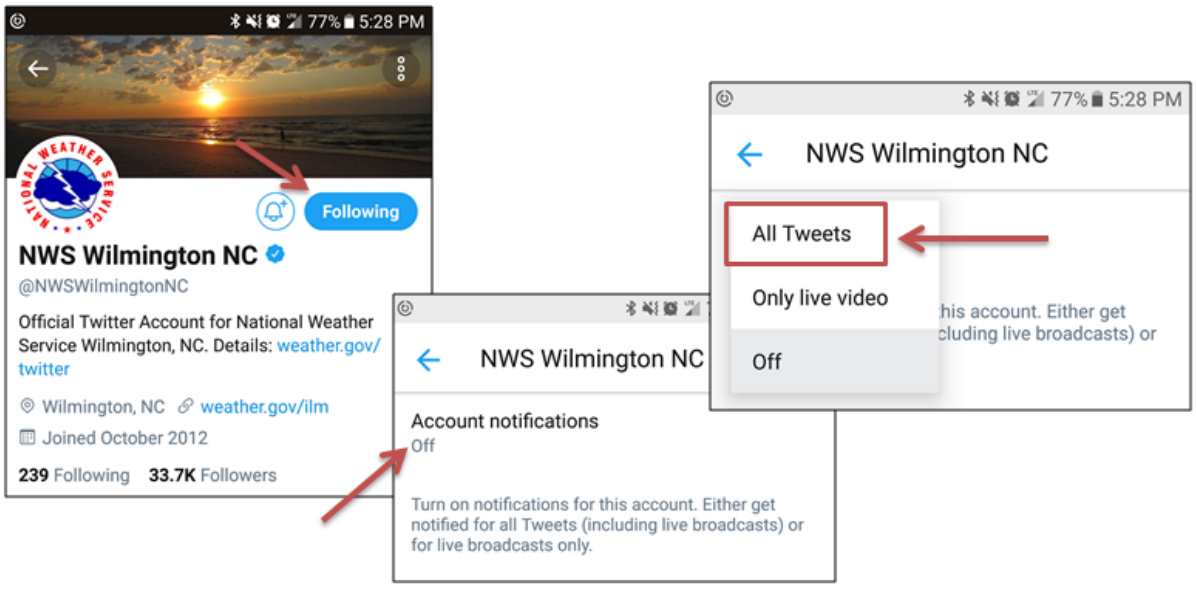
WEATHER-READY NATION

Social Media Notifications

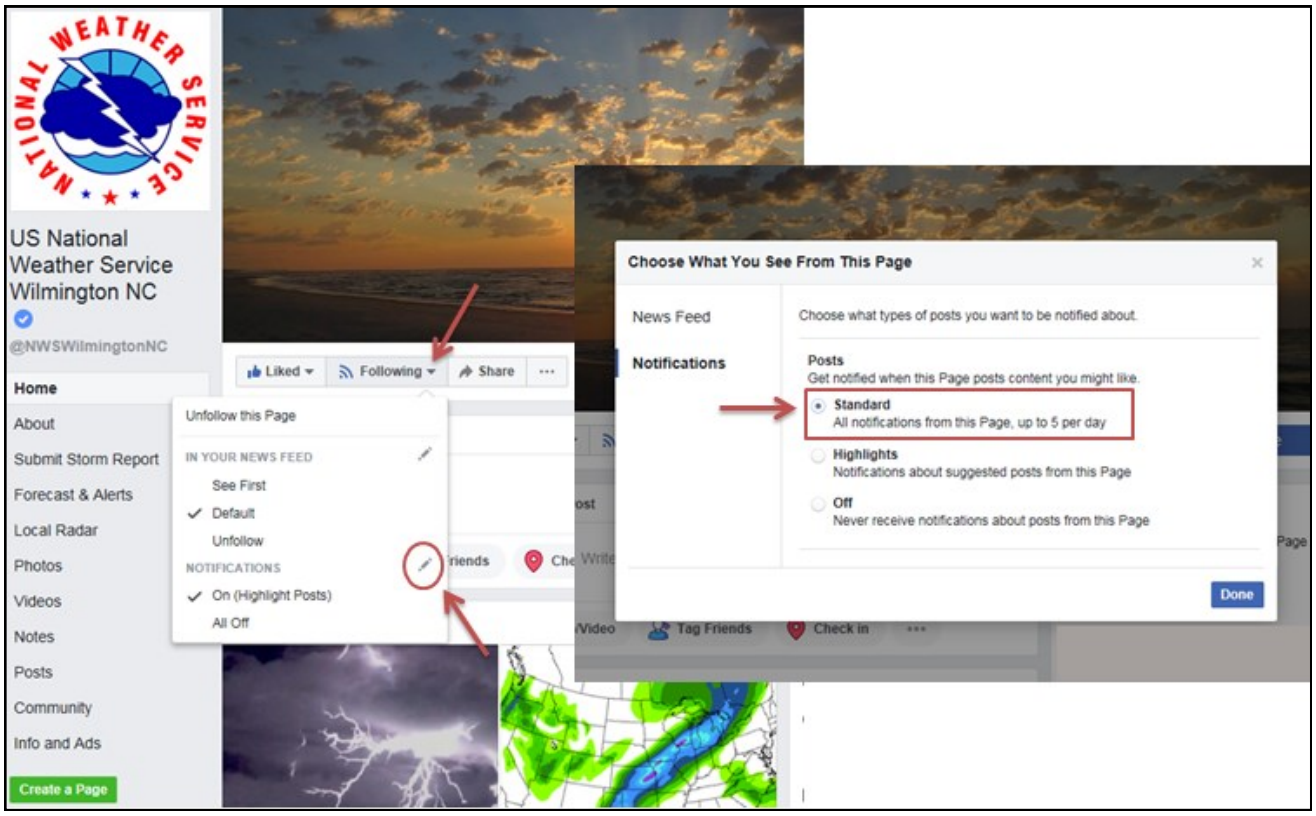
Whether it's during active weather, storms in your area, or you are just interested in information from the National Weather Service, you can turn on social media notifications from your local NWS office to stay notified of ongoing weather in your area. For Twitter, you can turn on mobile notifications alerting you of new tweets from your NWS office. For Facebook, you can choose to turn on Notifications for the NWS page that will send you a notification within Facebook for new posts, up to 5 a day.

Twitter via Desktop

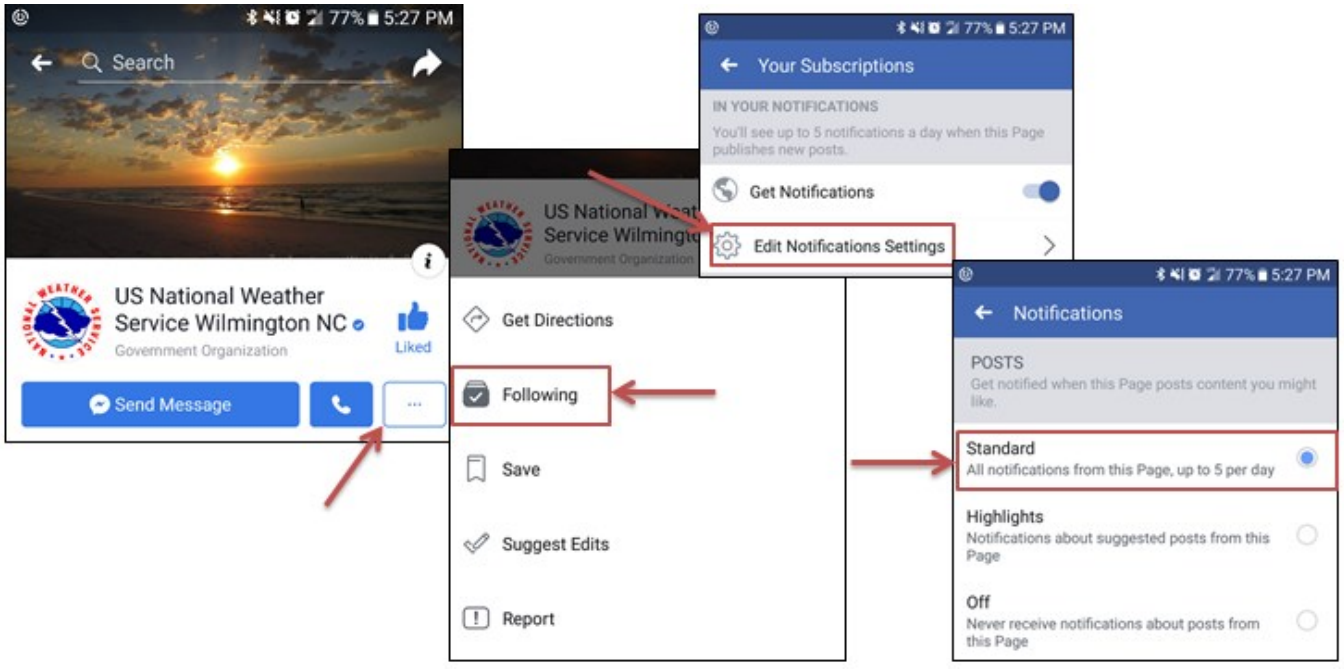
Twitter via Mobile



Facebook via Desktop



Facebook via Mobile



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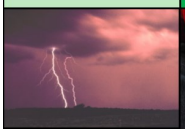
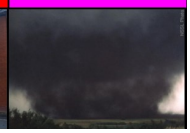
Weather Forecast Office
Wilmington, NC

2015 Gardner Drive
Wilmington, NC 28405
Phone: (910) 762-4289
www.weather.gov/ilm

Webmaster's Email:
ILM.webmaster@noaa.gov

Understanding Severe Weather Outlooks - Issued by the SPC:

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	**Isolated severe thunderstorms possible**	**Scattered severe storms possible**	**Numerous severe storms possible**	**Widespread severe storms likely**	**Widespread severe storms expected**
Lightning/flooding threats exist with all thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
					

The Wilmington Wave

Volume X, Issue I

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WE NEED YOUR STORM REPORTS!

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Storm reports **ONLY**

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